

Design of 4-bit Flash ADC

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Agenda

- ▶ Specification
- ▶ Schematic
- ▶ Design Parameter for Comparator
- ▶ Output Waveform of a 4 Bit Flash ADC
- ▶ Outcome

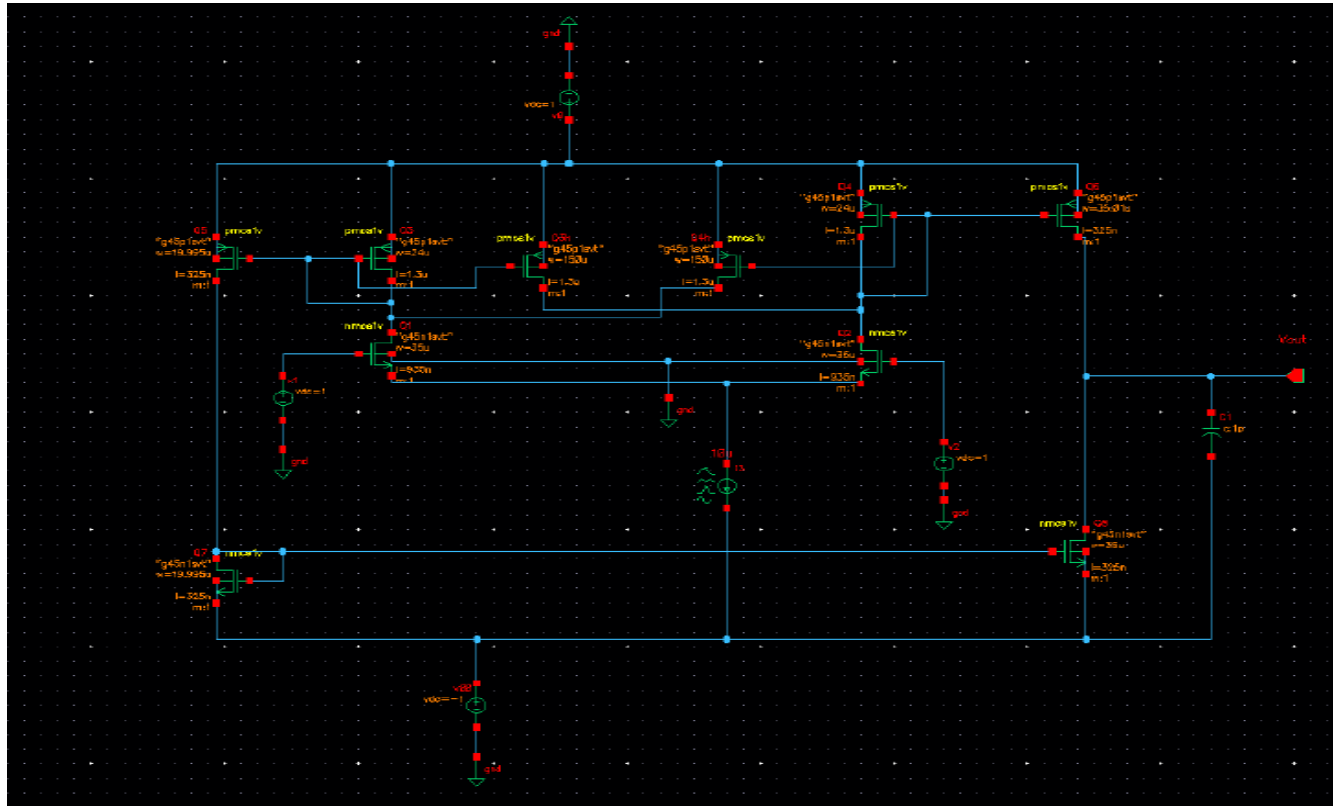
Specifications

Parameter	Value
Supply Voltage	2V \pm 10%
Reference Voltage	1 V
Bias Current	10 μ A
Operating Temperature	0°C to 85°C
Propagation Delay	< 30nS
Number of Bits	4
Load Capacitance	1pF
DNL	\pm 0.5LSB
INL	\pm 1LSB

Overall Schematic



Comparator Schematic

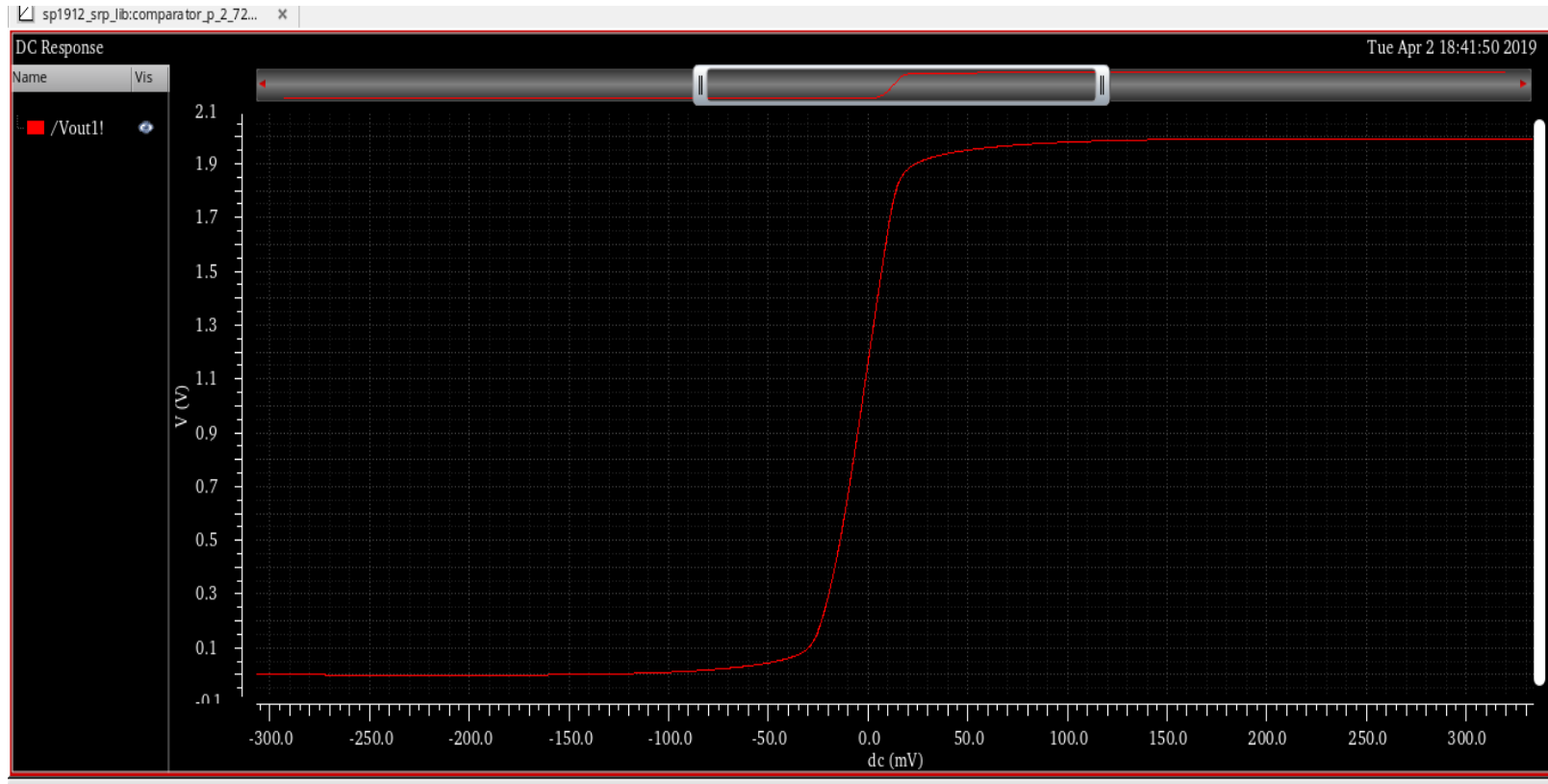


- This schematic contains initial approach for the parameters.
- Final Parameters for the comparator design is shown below.

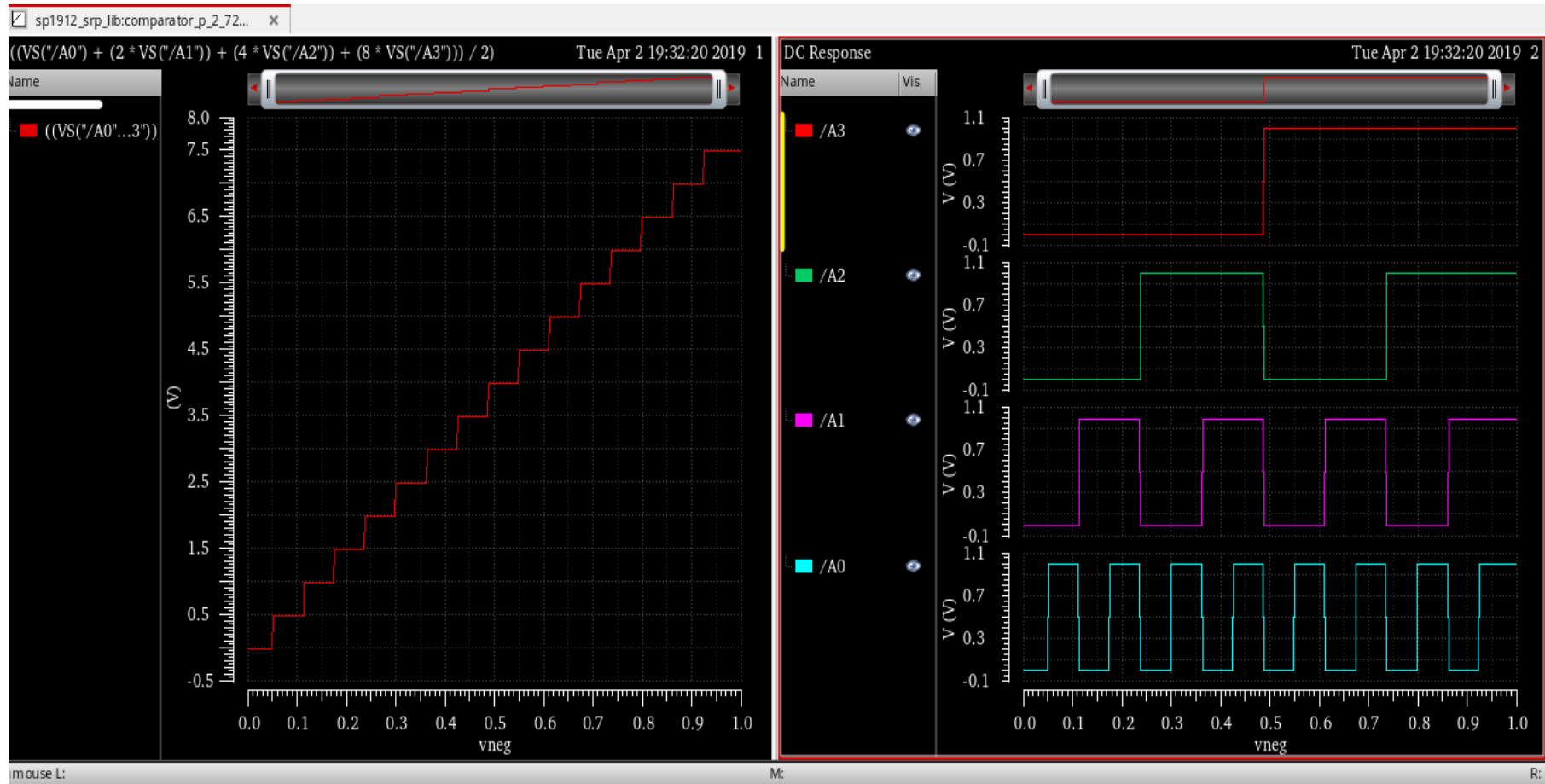
Design Parameter for Comparator

MOSFETs	W/l(New)
M1	50 μ m/1 μ m
M2	50 μ m/1 μ m
M3	5 μ m/1 μ m
M4	5 μ m/1 μ m
M5	25 μ m/1 μ m
M6	40 μ m/1 μ m
M7	50 μ m/2 μ m
M8	50 μ m/2 μ m

Output Waveform for Comparator



Output Waveform of a 4 Bit Flash ADC



Outcome

- ▶ Offset and gain errors are 0.05mV and 17.25 mV respectively.
- ▶ Propagation delay less than 30ns.
- ▶ Maximum DNL observed is 0.056 LSB and INL is -0.041 LSB.
- ▶ Total current observed is 55.51 μA .
- ▶ Area estimation : $180\mu\text{m} \times 100 \mu\text{m}$